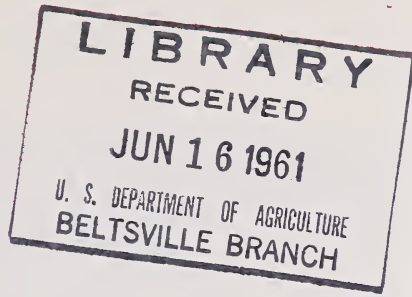


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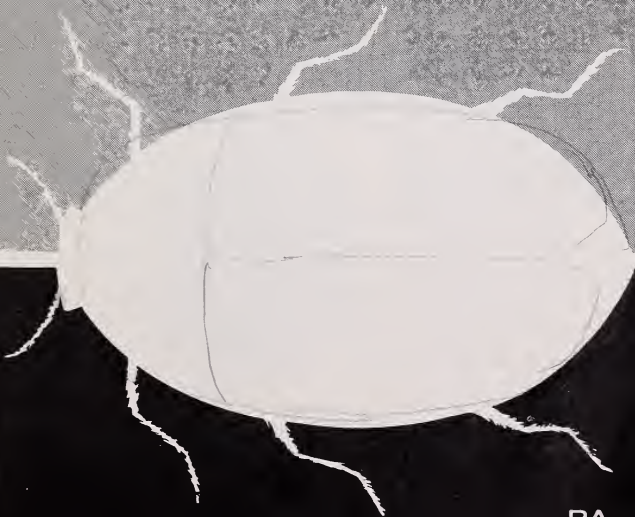
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THE KHAPRA BEETLE



A PEST OF
STORED GRAINS
AND CEREAL
PRODUCTS



PA-436

U.S. DEPARTMENT OF AGRICULTURE

The khapra beetle is a relatively new insect pest in the United States. It seriously damages stored cereal products, and feeds on whole kernels of stored cereal grains—wheat, corn, barley, oats, rye, and rice. It also attacks stored seed, cottonseed meal, nut meats, dried fruits, and other products of plant or animal origin.

This pest causes severe losses of infested products. Total loss can be expected when infested grain is left undisturbed in storage for long periods. The insect has become a threat to billions of bushels of important products stored in the United States.

THE KHAPRA BEETLE



X 4

Adult khapra beetle.



ORIGIN AND SPREAD

The khapra beetle was first known in India and Ceylon. It spread to Japan, the Philippines, and to England, Europe, and Africa. It was first discovered in this country in California in 1953, but may have been here as early as 1945. It has been found in more than 200 establishments in Arizona, more than 300 in California, 19 in New Mexico, and 22 in Texas. It has occurred in 84 such establishments in Mexico. Its spread has been facilitated by the fact that slight infestations are difficult to detect in products stored in sacks, cartons, trucks, railway cars, or granaries.



Khapra-beetle larvae feeding on stored corn.

ERADICATION PROGRAM

A continual, cooperative program of eradication is being carried out by the U.S. Department of Agriculture, the affected States, and Mexico. New infestations are treated as soon as possible after they are discovered.

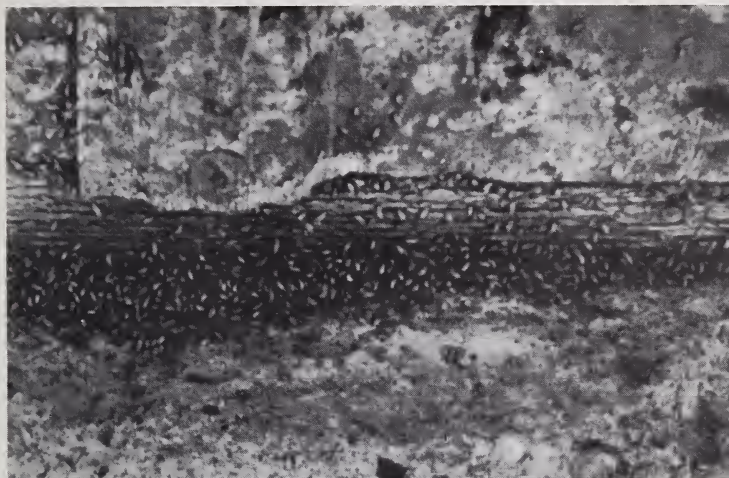
EARLY DETECTION

It is important to locate infestations at an early stage. Then, eradication measures can be started in time to prevent serious damage and stop spread of the pest to new localities.

The khapra beetle is difficult to detect because of its size—it is only about $\frac{1}{8}$ inch long. Detection surveys are made repeatedly by State and Federal entomologists in States where infestations exist. They are made periodically in principal storage areas throughout the United States and Mexico. But these surveys are not adequate to prevent further spread of the pest. Help is needed from all handlers of stored products—farmers; operators of grain, feed, and seed houses; trucking and railway companies; and food storage concerns.

QUARANTINE

Whenever an infestation is found, the site is placed under regulation; cooperative eradication measures are begun. To



Khapra-beetle larvae, ready to pupate, congregated in corner of grain bin.

meet the requirements of the quarantine regulations, stored products and all articles exposed to the khapra beetle must be treated and certified free of infestation before they may be moved from an infested site. Eradication procedures are carried out by private fumigation operators, under contract to, and under supervision of, State or Federal agencies.

Ports of entry. — Domestic freight traffic is increasing and ocean-going cargo ships are plying the St. Lawrence Seaway. Because of this, inspections have been intensified to prevent the khapra beetle from reaching vital midwest storage facilities. In one year, Federal quarantine inspectors have intercepted the khapra beetle 43 times, at 16 different ports of entry.

ERADICATION TREATMENT

The khapra beetle cannot be eradicated by using conventional insecticide sprays or the customary dosages of grain-treatment fumigants. Special measures must be employed to destroy the pest. Methyl bromide and hydrogen cyanide gases are effective fumigants when used at concentrations higher than those necessary to kill other grain pests. High concentrations should be used only under supervision of a specialist.

The quickest eradication treatment that meets provisions of quarantine regulations is as follows:

All storage buildings are wrapped with gas-tight tarpaulins in preparation for fumigating the stored products and the structures with methyl bromide gas. At the rate of 5 pounds per 1,000 cubic feet, gas is introduced into the chamber formed by the tarpaulins, and is held there for 48 hours. For at least 24 hours of this period, gas concentration is maintained at predetermined level in the stored products, and throughout the fumigation chamber. Gas concentration is determined by running a number of tubes to various locations in the chamber; samples of gas are drawn off through these tubes at regular intervals, and passed through a gas analyzer.

The area surrounding infested structures is treated three times, at 3- to 7-day intervals, with a spray containing 5 pounds of malathion in each 100 gallons of diesel fuel. The sprayed area is raked or harrowed between applications to assure wetting of all debris and other material.

When infested premises are treated in this manner, they can be released from regulation immediately. If infestations are light, other approved procedures may be employed at discretion of Federal or State control supervisors. Only part of the structures on an infested premise may be treated, or structures may be treated without draping with tarpaulins. If the modified procedures are used, the infested premises must remain under regulation for a year. Three inspections at least 90 days apart—the final one during the last month of the period of regulation—must show that the premises are free of infestation. Then they can be released from regulation.

HOW YOU CAN HELP

- Watch for this pest; look for it particularly in grain and grain products that have been stored for an extended period.
- Examine sacks and other containers, to find any infestations. Do this before shipment, and before the containers are reused for stored products. Sacks or containers showing presence of stored products insect pests should be fumigated before reusing.
- Report suspected khapra beetle infestations to State or Federal plant pest control inspectors, or to your county agricultural agent.
- Collect samples of suspected insects, and place them in vials containing rubbing alcohol or grain alcohol. Give the samples to the above-named officials, or mail them to the Plant Pest Control Division, U.S. Department of Agriculture, Washington 25, D.C. Do not mail live specimens of khapra beetles. Include your return address with a note stating that the samples are suspected of being khapra beetles.
- Comply with all quarantine regulations. Cooperate with program personnel in eradicating the pest if it is found on your premises.

DEVELOPMENT AND HABITS

The development of the khapra beetle has four stages—egg, larva, pupa, and adult. The length of the life cycle (egg to adult) varies from 28 days at 70° F. to 220 days at 93°–95°. The insects may die during development at temperatures under 40° or over 104°.

Eggs are about 1/64 inch long, and white.

Larvae are yellowish-white upon hatching; they change to reddish-brown as they shed their skins 2 to 11 times. They are about 1/4 inch long when full grown.

Pupae are about 1/4 inch long, and are enclosed in the last larval skin.

Adult moles are small, brownish-black beetles, about 1/8 inch long. Adult females are a little longer, and lighter in color.

Young larvae are unable to feed on whole kernels of grain, and depend upon damaged kernels or grain products for food. Older larvae can feed on whole grains. The amount of food present is a factor in the speed of their development, but larvae can survive long periods without food. Adults feed very little, if at all.

The khapra beetle feeds only on stored products—never on growing crops. The beetle cannot fly, so its movement is limited. Activity of the insect is generally confined to the top 12 inches of grain, although it has been found as deep as 12 feet, particularly in corners and along walls of bins.

The insects crowd into cracks in masonry, woodwork, and cartons, into creases of sacks, in debris, and in other protected places where they are difficult to find.

Prepared by PLANT PEST CONTROL DIVISION
AGRICULTURAL RESEARCH SERVICE

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Washington, D.C.

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Barley infested by khapra-beetle larvae.

BN-9573X



Khapra-beetle larvae in lima beans.

BN-9434X



Searching for khapra beetles in grain scattered on railroad siding outside storage buildings.

BN-2245X



Grain elevator encased in plastic-coated nylon tarpaulins during fumigation to kill khapra beetles.